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4

Bescheinigung | Certificate | Attestation

EP99/8131

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Patentanmeldung Nr. | Patent application No. | Demande de brevet n°

98308823.8

PRIORITY DOCUMENT
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Der Präsident des Europäischen Patentamts;
Im Auftrag

For the President of the European Patent Office

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Blatt 2 der Bescheinigung
Sheet 2 of the certificate
Page 2 de l'attestation

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VACUUM PACKAGING MACHINE

The present invention relates to a vacuum packaging machine for performing a vacuum sealing operation on product packages.

Vacuum packaging machines of a known type comprise a vacuum chamber arranged to receive at least one unsealed product package and operable to perform a vacuum sealing operation on the at least one product package. Typically the product packages are products arranged in a bag formed by a heat-shrinkable film. After loading and closing the vacuum chamber, the vacuum sealing operation normally comprises vacuumisation, sealing the mouth of the vacuumised bags, and reintroducing air into the chamber. Then the chamber is opened and the vacuum chamber is unloaded. The product packages may then be conveyed to a heat-shrinking unit, typically a hot water tunnel or a dip tank.

The vacuumisation step typically takes at least 20-30 seconds which is mostly wasted time in the overall packaging process. During this time, the only step which can be taken is to prepare the next product packages for loading into the vacuum chamber, for example by conveying them onto an in-feed conveyor. Accordingly, the vacuum packing machine causes a bottle-neck in the overall packaging process.

According to the present invention, the vacuum packaging machine comprises a plurality of vacuum chambers each arranged to receive at least one unsealed product package and operable to perform an independent vacuum sealing operation on the at least one product package.

The provision of more than one vacuum chamber in the vacuum packaging machine allows respective vacuum chambers to perform a vacuum sealing operation while

another vacuum chamber is being loaded and/or unloaded. Therefore, the machine may minimise the wasted time in the vacuum packaging process. Consequently, the present invention can increase through-put and increase productivity of a packaging line including the machine.

Preferably, the vacuum packaging machine further comprises a conveyor arrangement operable to load and unload a selective vacuum chamber with the at least one product package, and the machine is arranged to operate the respective vacuum chambers to perform the vacuum sealing operation while the conveyor arrangement is operated to load and unload another vacuum chamber.

The conveyor arrangement can automatically load and unload selected vacuum chambers. Operation of one or more of the vacuum chambers while the conveyor arrangement is loading and unloading another vacuum chamber reduces the amount of time wasted, thereby increasing through-put and increasing productivity of a packaging line including the machine.

Preferably, the machine is arranged to operate the conveyor arrangement to load and unload the vacuum chambers in a cyclical sequence and synchronously to operate the respective vacuum chambers to perform the vacuum sealing operation on the at least one product packages after loading. This allows the machine to be utilised in an automatic packaging line. It is desirable that the number of vacuum chambers is sufficient relative to the duration of the vacuum sealing operation to allow the conveyor arrangement to operate continuously because this minimises the amount of wasted time. Time wastage can be reduced further by designing the conveyor arrangement to load and unload the vacuum chambers more rapidly. The described embodiments include particularly suitable conveyor arrangements as follows.

Preferably the conveyor arrangement includes an in-

feed conveyor operable to load a selected vacuum chamber with the at least one product package.

The vacuum chambers may be spaced in an array extending transversely to the direction of product movement along a product line, for example stacked vertically or laterally spaced apart horizontally.

Whilst the in-feed conveyor may be operable in reverse to unload a selected vacuum chamber, it is preferable that the conveyor arrangement additionally includes an out-feed conveyor operable to unload a selected vacuum chamber with the at least one product package.

Provision of separate in-feed and out-feed conveyors allows the loading and unloading to occur simultaneously, for example if the in-feed and out-feed conveyors are linked by an internal conveyor in each vacuum chamber.

The in-feed conveyor and/or out-feed conveyor may be movable to select the vacuum chamber to be loaded. Additionally or alternatively, the plurality of vacuum chambers are movable together relative to the conveyor arrangement to select the vacuum chamber to be loaded and unloaded.

The conveyor arrangement may include a plurality of in-feed conveyors and/or out-feed conveyors which are movable together. In this case, the vacuum chambers are preferably arranged in a regular array and the in-feed conveyors and/or out-feed conveyors have a relative transverse spacing equal to a transverse spacing between the vacuum chambers in the array. This allows more than one vacuum chamber to be loaded and/or unloaded simultaneously.

Conveniently the vacuum chambers each have a sealing bar arranged along a side of the respective vacuum chamber for sealing the at least one product packages, preferably along one side only. This prevents the

sealing bar from hindering loading and unloading improves the automatic operation of the machine because the product packages always have the same orientation.

In order that the present invention may be better understood, the following description of non-limitative preferred embodiments is given merely by way of example with reference to the accompanying drawings in which:

Fig. 1 is a top plan view of a packaging line including a vacuum packaging machine which is a first embodiment of the present invention

Fig. 2 is a sectional side view of the first embodiment of the present invention;

Fig. 3 is a sectional side view of a second embodiment of the present invention;

Fig. 4 is a sectional side view of a third embodiment of the present invention; and

Fig. 5 is sectional side view of a fourth embodiment of the present invention.

Fig. 1 illustrates a vacuum packaging machine 1 which is a first embodiment of the present invention. It is arranged in a packaging line 100 constituted by a series of conveyors. At bagging section 101, products are bagged in heat-shrinkable film bags, or alternatively in small pouches made from thin films, and arranged on line 100 as product packages 2.

As shown in Fig. 2, the vacuum packaging machine 1 has an external housing 3 containing two vertically stacked vacuum chambers 4a, 4b. Except as described below, each vacuum packaging chamber 4a, 4b is in itself of conventional construction and performs a vacuum sealing operation in a conventional manner.

Each vacuum chambers 4a, 4b has a chamber conveyor 5a, 5b to convey product packages 2 therethrough, and a respective sealing bar 12 arranged along one side of the chamber alongside the corresponding chamber conveyer 5. Provision of a sealing bar 12 on one side only

facilitates automatic feeding because loading is made easier by the bags being orientated in the same direction.

Each chamber has a respective entrance door 6a, 6b and exit door 7a, 7b. The doors are preferably mounted to slide perpendicularly to the movement of packages through vacuum chambers 4a, 4b, for example on horizontal upper and lower trails. Any other suitable door arrangement is possible, for example, vertically sliding or hinged doors.

An in-feed conveyor 8 and an out-feed conveyor 9 are provided on opposite sides of the vacuum chambers 4a, 4b facing entrance doors 6a, 6b and exit doors 7a, 7b. The in-feed and out-feed conveyors 8, 9 are independently, vertically moveable between a lower position shown in bold outline in Fig. 2 for loading and unloading the lower vacuum chamber 4a and a higher position shown in dotted outline in Fig. 2 for loading and unloading the upper vacuum chamber 4b.

A fixed conveyor 10 is provided to receive unsealed product packages 2 into the machine 1 from station 101 along line 100 and supply them to the in-feed conveyor 8. Another fixed conveyor 11 receives sealed packages 9 from the out-feed conveyor 9 and outputs them along line 100.

In an alternative construction, the in-feed and out-feed conveyor 8, 9 are fixed in the position shown in bold in Fig. 2 and the vacuum chambers 4a, 4b are movable together vertically between upper position, as shown in Fig. 2, for loading and unloading the lower vacuum chamber 4a and a lower position in which the vacuum chamber 4b is aligned with in-feed and out-feed conveyors 8, 9 for loading and unloading.

Preferably, all the conveyors 5, 8, 9, 10, 11 are driven to execute an indexing motion.

The vacuum chambers 4a, 4b are illustrated as

accommodating two product packages, but they may be dimensioned to accommodate any number of product packages 2.

The vacuum packaging machine 1 is operated in a continuous cycle which will now be described. These vertically stacked chambers have end doors for in-feed and out-feed.

As an arbitrary starting point within the cycle, we can take the point at which the vacuum sealing operation in the lower vacuum chamber 4a has just finished. At this time, the vacuum sealing operation in the upper vacuum chamber 4b is underway. Entrance and exit doors 6a, 7a of the lower vacuum chamber 4a are opened. Next, the fixed conveyors 10,11, the in-feed and out-feed conveyors 8, 9 and the lower chamber conveyor 4a are simultaneously operated (i) to load lower vacuum chamber 4a with new unsealed product packages from the in-feed conveyor 8, (ii) to unload the lower vacuum chamber 4a onto the out-feed conveyor 9, and (iii) to supply new unsealed product packages 2 onto the in-feed conveyor 8. Exact synchronisation is preferable but some degree of overlap may be desirable. The doors 6a, 7a of the lower vacuum chamber 4a are then closed for commencement of the vacuum sealing operation, that is vacuumisation of the chamber 4a and sealing of the product packages 2 by sealing bar 12.

During the vacuum sealing operation in the lower vacuum chamber 4a, loading and unloading of the upper vacuum chamber 5 is performed. The out-feed conveyor 9 is operated briefly to clear sealed products off it. Then the in-feed and out-feed conveyors 8, 9 are raised to the upper vacuum chamber 4b and when the vacuum sealing operation in the upper vacuum chamber 4b has finished, its doors 6b, 7b are opened. Simultaneous operation of the in-feed and out-feed conveyors 8, 9 and

the upper chamber conveyor 4b loads and unloads the upper vacuum chamber 4b.

Subsequently, the upper chamber doors 6b, 7b are closed and the vacuum sealing operation in the upper vacuum chamber 4b is commenced. At the same time, the in-feed and out-feed conveyors 8, 9 are operated to load and unload the lower vacuum chamber 4a. That is to say, the in-feed and out-feed conveyors 8, 9 are lowered and then the in-feed conveyor 8 is operated simultaneously with the fixed conveyor 10 to fill the in-feed conveyor with new product packages 2 from in-feed conveyor 8 while the sealed packages move onto the out-feed conveyor 9.

The cycle then repeats.

Various modifications to the cycle are possible. For example, instead of simultaneously loading and unloading a vacuum chamber 4 by operating the in-feed and out-feed conveyor 8, a chamber conveyor 5 and out-feed conveyor 9 together, it is possible to operate in-feed conveyor 8 and out-feed conveyor 9 independently to perform loading and unloading separately.

A second embodiment is shown in Fig. 3 and employs three vertically stacked vacuum chambers 4a, 4b, 4c which are loaded and unloaded in a cyclical sequence synchronously with operation of the vacuum chambers. A possible sequence is: to load and unload vacuum chamber 4a; to commence vacuum sealing operation in the lower vacuum chamber 4a and simultaneously to load and unload the middle vacuum chamber 4b; to commence the vacuum sealing operation in the middle vacuum chamber 4b and simultaneously to load and unload the vacuum chamber 4c; to commence the vacuum sealing operation in the upper vacuum chamber 4c and simultaneously to load and unload the lower vacuum chamber 4a once its own vacuum sealing operation has finished.

A third embodiment shown in Fig. 4 employs three

vacuum chambers 4a, 4b, 4c with a pair of in-feed conveyors 8a, 8b and a pair of out-feed conveyors 9a, 9b. This allows the machine simultaneously (i) to operate one in-feed conveyor and out-feed conveyor (ii) to load and unload product packages 2 from one vacuum chamber 4 and (iii) to operate the other in-feed conveyor to fill it with new unsealed product packages 2 and the other out-feed conveyor to empty it of sealed product packages 2. This saves time in the operation cycle as compared to machines having a single in-feed conveyor and a single out-feed conveyor.

A third embodiment illustrated in Fig. 5 has two separated pairs of vacuum chambers 4a, 4b and 4c, 4d and a pair of in-feed conveyors 8a, 8b and a pair of out-feed conveyors 9a, 9b having a relative vertical spacing equal to the vertical spacing between the vacuum chambers of each pair 4a, 4b and 4c, 4d.

In fact, the vacuum chambers may be arranged in any regular array. If the in-feed and/or out-feed conveyors then have a relative spacing equal to the spacing between the vacuum chambers in the array, this can allow loading and unloading of respective chambers simultaneously.

In fact any number of configurations of vacuum chambers may be provided. Preferably the number of vacuum chambers is sufficient relative to the length of the vacuum sealing operation to allow the machine to handle the maximum rate of product package through-put on the packaging line. Therefore the preferred number and configuration of vacuum chambers depends both on the speed of the line and on the size of the vacuum chambers which is governed by the size of the product packaging.

The spacing between the vacuum chambers need not be vertical. They may instead be horizontally spaced, in which case it is possible for the chambers to have liftable top covers instead of end entry and exit doors.

C L A I M S

1. A vacuum packaging machine for performing a vacuum sealing operation on product packages, comprising a plurality of vacuum chambers each arranged to receive at least one unsealed product package and operable to perform an independent vacuum sealing operation on the at least one product package.

2. A vacuum packaging machine according to claim 1, further comprising:

a conveyor arrangement operable to load and unload a selective vacuum chamber with the at least one product package, and

wherein the machine is arranged to operate the respective vacuum chambers to perform the vacuum sealing operation while the conveyor arrangement is operated to load and unload another vacuum chamber.

3. A vacuum packaging machine according to claim 2, wherein the machine is arranged to operate the conveyor arrangement to load and unload the vacuum chambers in a cyclical sequence and synchronously to operate the respective vacuum chambers to perform the vacuum sealing operation on the at least one product packages after loading.

4. A vacuum packaging machine according to claim 3, wherein the number of vacuum chambers is sufficient relative to the duration of the vacuum sealing operation to allow the conveyor arrangement to operate continuously.

5. A vacuum packaging machine according to any one of claims 2 to 4, wherein the conveyor arrangement

includes an in-feed conveyor operable to load a selected vacuum chamber with the at least one product package.

6. A vacuum packaging machine according to claim 5, wherein the in-feed conveyor is movable to select the vacuum chamber to be loaded.

7. A vacuum packaging machine according to claim 6, wherein the conveyor arrangement includes a plurality of in-feed conveyors which are movable together to select the vacuum chamber to be loaded.

8. A vacuum packaging machine according to claim 7, wherein the vacuum chambers are arranged in a regular array and the in-feed conveyors have a relative transverse spacing equal to a transverse spacing between vacuum chambers in the array to allow the in-feed conveyors to load respective vacuum chambers simultaneously.

9. A vacuum packaging machine according to any one of claims 5 to 8, wherein the in-feed conveyor is operable in reverse to unload a selected vacuum chamber.

10. A vacuum packaging machine according to any one of claims 5 to 8, wherein the conveyor arrangement includes an out-feed conveyor operable to unload a selected vacuum chamber with the at least one product package.

11. A vacuum packaging machine according to claim 10, including an internal conveyor in each vacuum chamber, extending between the in-feed and out-feed conveyors.

12. A vacuum packaging machine according to claim 10 or 11, wherein the out-feed conveyor is movable to select the vacuum chamber to be unloaded.

13. A vacuum packaging machine according to claim 12, wherein the conveyor arrangement includes a plurality of out-feed conveyors which are movable together to select the vacuum chamber to be unloaded.

14. A vacuum packaging machine according to claim 13, wherein the vacuum chambers are arranged in a regular array and the out-feed conveyors have a relative transverse spacing equal to a transverse spacing between vacuum chambers in the array to allow the out-feed conveyors to unload respective vacuum chambers simultaneously.

15. A vacuum packaging machine according to any one of claims 2 to 14, wherein the plurality of vacuum chambers are movable together relative to the conveyor arrangement to select the vacuum chamber to be loaded and unloaded.

16. A vacuum packaging machine according to any one of the preceding claims, wherein the vacuum chambers are arranged in a vertical stack.

17. A vacuum packaging machine according to any one of the preceding claims, wherein the vacuum chambers each have a sealing bar arranged along a side of the respective vacuum chamber for sealing the at least one product packages.

18. A vacuum packaging machine according to claim 17, wherein the vacuum chambers have a sealing bar

arranged along one side only of the respective vacuum chamber.

ABSTRACT

VACUUM PACKAGING MACHINE

A vacuum packaging machine for performing a vacuum sealing operation on product packages, comprises a plurality of vacuum chambers (4) which each manage to receive at least one unsealed product package (2) and are operable to perform an independent vacuum sealing operation on the least one product package (2). A conveyor arrangement (8, 9) is operable to load and unload a selected vacuum chamber (4) with the at least one product package, and the machine is arranged to operate the respective vacuum chambers (4) to perform the vacuum sealing operation while the conveyor arrangement is operated to load and unload another vacuum chamber (4). The conveyor arrangement loads and unloads the vacuum chambers in sequence, and the vacuum chambers are synchronously operated to perform the vacuum sealing operation to allow the conveyor arrangement to operate continuously. The conveyor arrangement comprises an in-feed conveyor (8) and an out-feed conveyor (9) which are independently movable to select the vacuum chamber to be loaded and unloaded. There may be a plurality of in-feed conveyors (8) and a plurality of out-feed conveyors (9). The vacuum chambers each have a sealing bar arranged along one side for sealing the product packages.

1/2

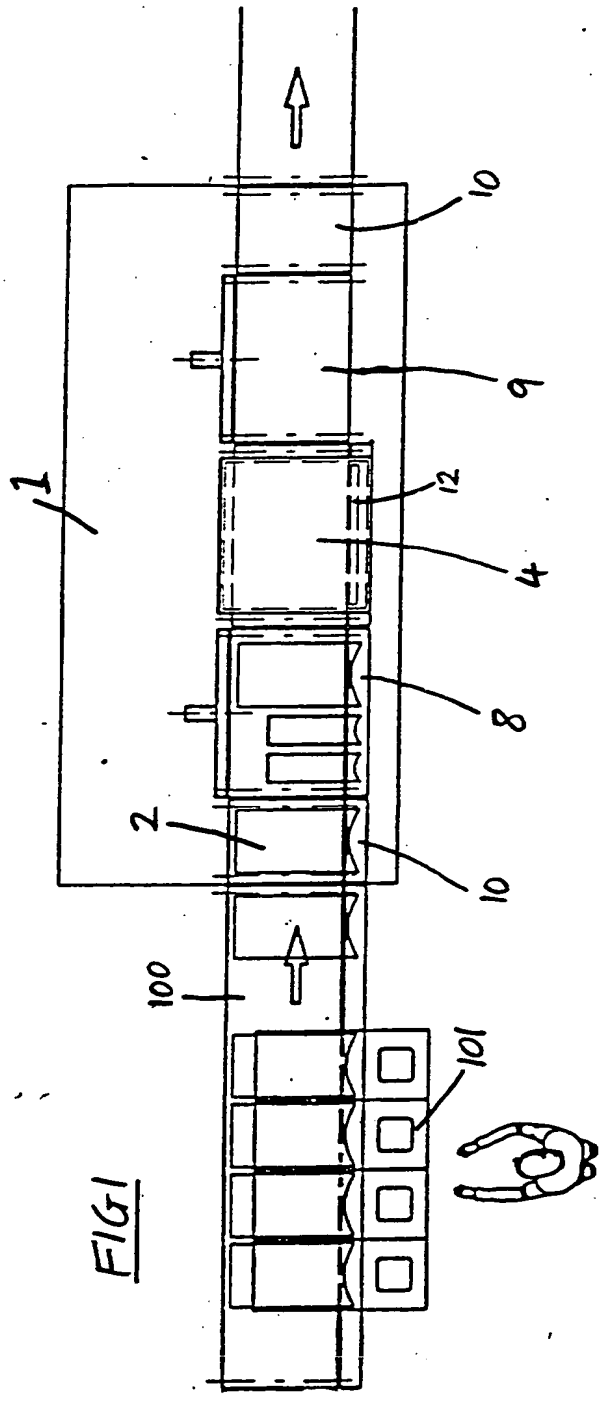

FIG1

FIG2

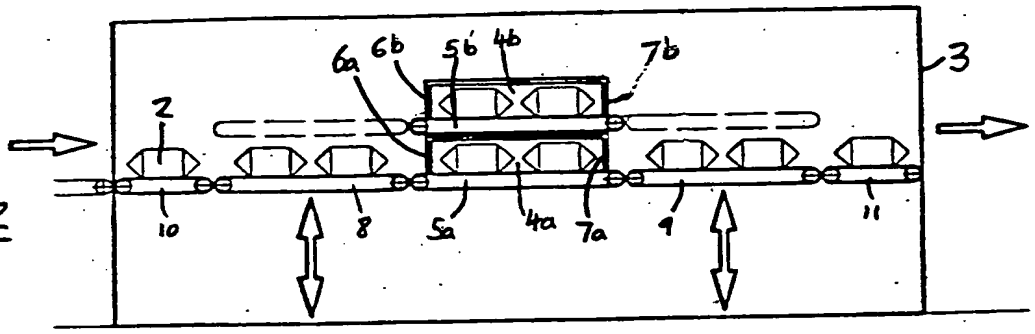

FIG3

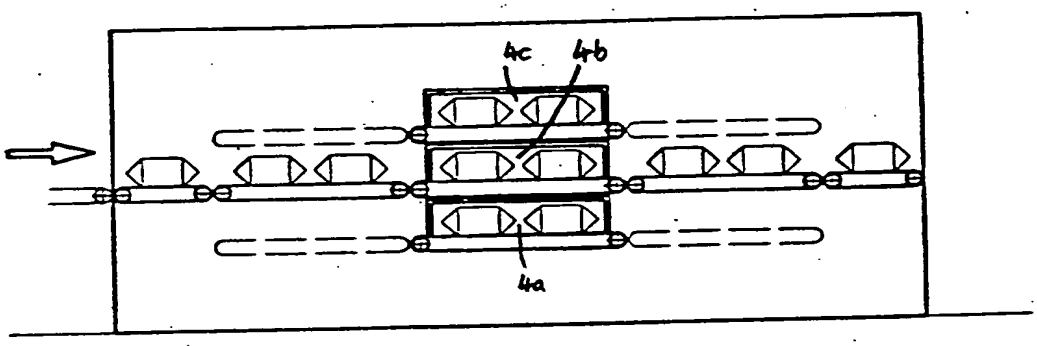

FIG 4

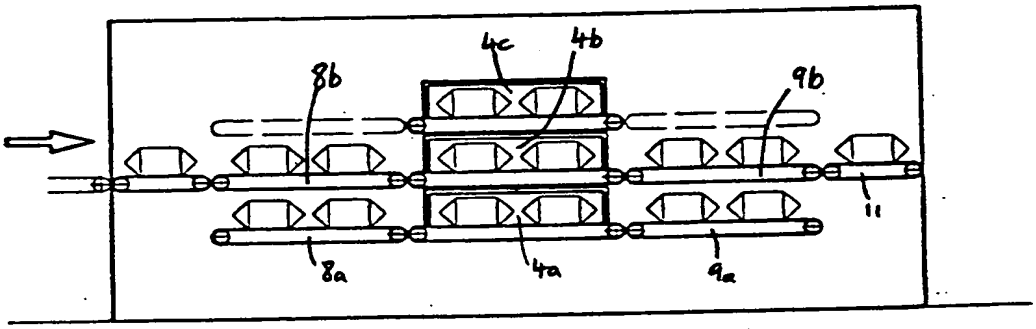

FIG 5